

Next Generation X-ray Detectors for a Probe Class Mission this Decade

Completed Technology Project (2012 - 2014)



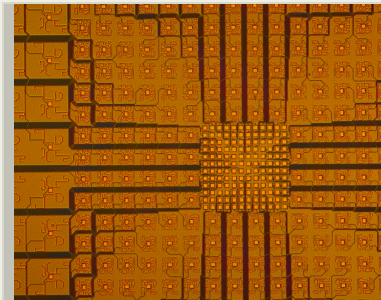
Project Introduction

This effort comprises the design, production, and test of a novel focal plane for x-ray astrophysics. Our group has previously developed a multi-absorber pixel (the Hydra) that achieves high spatial and electrical resolution in large focal planes, sacrificing x-ray count rate to readout the large array with fewer total sensors. For our new design, we create a large field of view imager, from two arrays of hydra designs at two different absorber scales surrounding a central array with high-resolution, high-speed single pixels. New methods of array heatsinking will be explored in this array with the intention of achieving the best specifications of each detector design within a single array.

Design of the three array focal plane includes calculation of the various pixel performance specifications to optimize for each sub-array. Meeting the demanding specifications of each design is complicated by the fact that certain layers in the fabrication (such as the superconducting device layer that determines operation temperature) are common to the three arrays, limiting the design space. Additionally, the presence of the different device scales presents a challenge to wiring of the array and the need to develop a low crosstalk crossover method for sorting the array into region that can share common bias of its pixels. The second phase of the work will focus on improving the heatsinking in these arrays. The heatsinking will be added last so that it can be varied in properties and heatsunk regions can be segregated. While more open-ended, this research will explore how improvements in practical array performance can be achieved.

Anticipated Benefits

N/A



Next Generation X-ray Detection

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Images	3
Project Website:	3
Technology Areas	3

Next Generation X-ray Detectors for a Probe Class Mission this Decade

Completed Technology Project (2012 - 2014)



Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Goddard Space Flight Center (GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Maryland

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Manager:

Terence A Doiron

Principal Investigator:

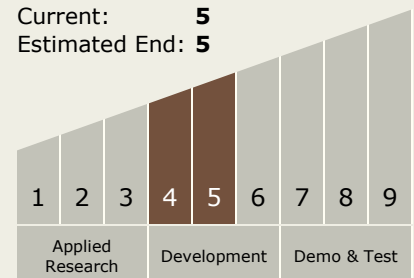
James A Chervenak

Technology Maturity (TRL)

Start: 4

Current: 5

Estimated End: 5

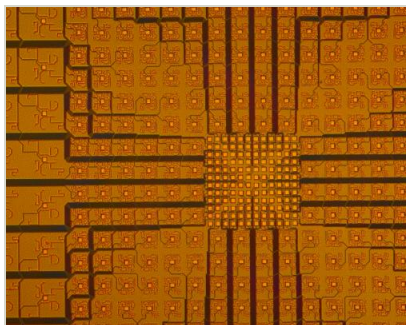


Next Generation X-ray Detectors for a Probe Class Mission this Decade

Completed Technology Project (2012 - 2014)



Images



Next Generation X-ray Detection for a Probe Class Mission

Next Generation X-ray Detection
(<https://techport.nasa.gov/image/3509>)

Project Website:

<http://sciences.gsfc.nasa.gov/sed/>

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes